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METHOD AND APPARATUS FOR LAMINATING GLASS SHEETS

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(56) Prior Art Documents
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(57) Claim

1. A method for laminating glass sheets by placing a plastic film between the glass sheets, wherein plastic film rolls of varying widths are stored in a refrigerated space above a first conveyor, film is unwound from the selected film roll onto the conveyor and a film is cut to a film sheet of a desired length, the film sheet is carried from the refrigerated space into a laminating space having a temperature which is higher than that of the refrigerated space, the film sheet is received in the laminating space onto a second conveyor upon which the film temperature rises and equalizes and the film shrinks prior to lamination, and the film sheet is transferred from the second conveyor onto a glass to be laminated, the latter being carried by a third conveyor which serves as an actual laminating conveyor.

7. An apparatus for laminating glass sheets by placing a plastic film between the glass sheets, said apparatus including a refrigerated space for the storage of plastic film rolls and a laminating space provided with a laminating conveyor for carrying glass sheets to be laminated as well as with a hoisting device for picking up a glass sheet from the laminating conveyor, wherein above the laminating space is located the refrigerated space, including a

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Method and apparatus for laminating glass sheets

The present invention relates to a method and apparatus for laminating glass sheets by placing a plastic films between the glass sheets. The apparatus includes a refrigerated space for the storage of rolls of plastic film and a laminating space provided with a laminating conveyor for carrying glass sheets to be laminated as well as with a hoisting device for picking up a glass sheet from the laminating conveyor

The applications of laminated glasses include various safety glasses (protection of property, bullet proofing), soundproofing glasses in hotels and airports, ultraviolet radiation controlling glasses, display windows etc.

Lamination is usually effected by using a PVB-plastic film, which film rolls must be held in a cold storage at less than 10°C in order to prevent the film layers from sticking to each other.

One problem with the prior known laminating methods and equipment is that a film transferred from a cold film roll onto a warmer glass sheet shrinks upon heating, whereby the film edges may even contract inside the glass edge since the contraction between glass sheets does not occur controllably and evenly. Therefore, the film must be provided with a considerable shrinkage allowance. Another problem is that, when changing the glass width, the film-roll unwinding unit must be reloaded with a new film roll which must be brought over from a separate cold storage of film rolls. This inconvenient roll replacement is often neglected if the new glass width is just slightly less than the width of a film roll already in operation. However, this increases the amount of film reject, adding to the price of a final product.

a laminating space provided with a laminating conveyor for carrying glass sheets to be laminated as well as with a hoisting device for picking up a glass sheet from the laminating conveyor, wherein above the laminating space is located the refrigerated space, including a plurality of unwinding units for the film rolls, and wherein the laminating space includes an intermediate conveyor for heating the film prior to transferring the same onto a glass sheet advancing on the laminating conveyor.

One exemplary embodiment of the invention will now be described in more detail with reference made to the accompanying drawings, in which

fig. 1 shows a lengthwise vertical section of an apparatus of the invention and

fig. 2 is a more detailed view of a film-roll unwinding unit included in the apparatus.

The film used in lamination is stored as rolls 7 in a refrigerated space 1, located above a laminating space 2. The spaces 1 and 2 are separated from each other by means of a floor 3 provided with a gap 11 for passing the film through. The laminating space 2 is provided with a horizontal laminating conveyor 4 and a hoisting device 5 for picking up a glass sheet from the conveyor 4 and for placing the same on top of another glass sheet and a plastic film covering the latter. Since the glass sheets to be laminated have highly varying dimensions, it is necessary to be able to vary also the dimensions of plastic film sheets in view of cutting down the film reject as much as possible.

According to the invention, the refrigerated space 1 contains a plurality of unwinding units 6 for film rolls 7. The rolls 7 included in various units 6 may have film widths differing from each other with a suitable gradation. Fig. 1 illustrates six different units but the number of units can

12 operate at an equal speed and, thus, the film can be set precisely according to the dimensions of a glass sheet.

With the exception of the roll width, said unwinding units 6 are identical and each provided with its own cutter element 19. Thus, each of the units 6 is in turn capable of an independent action and, thus, a film width desired at any given time can be selected merely by starting a proper unwinding unit 6.

It is obvious that the structural details of the invention can be varied in many ways within the scope of the annexed claims.

4. An apparatus as claimed in claim 3, wherein the refrigerated space is located above the laminating space.

5. An apparatus as claimed in claim 3 or 4, wherein with the exception of the roll width, the roll unwinding units are substantially identical and each fitted with its own cutter element for cutting the film to sheets of a desired length.

6. An apparatus as claimed in any one of claims 2 to 5, wherein the take-up conveyor included in the refrigerated space and the intermediate conveyor included in the laminating space are horizontal belt conveyors with at least the intermediate conveyor having a length which is at least equal to the maximum length of a glass to be laminated.

7. An apparatus for laminating glass sheets by placing a plastic film between the glass sheets, said apparatus including a refrigerated space for the storage of plastic film rolls and a laminating space provided with a laminating conveyor for carrying glass sheets to be laminated as well as with a hoisting device for picking up a glass sheet from the laminating conveyor, wherein above the laminating space is located the refrigerated space, including a plurality of unwinding units for the film rolls, and wherein the laminating space includes an intermediate conveyor for heating the film prior to transferring the same onto a glass sheet advancing on the laminating conveyor.

8. A method for laminating glass sheets substantially as herein described with reference to the accompanying drawings.

9. An apparatus for laminating glass sheets substantially as herein described with reference to the accompanying drawings.

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32848/95

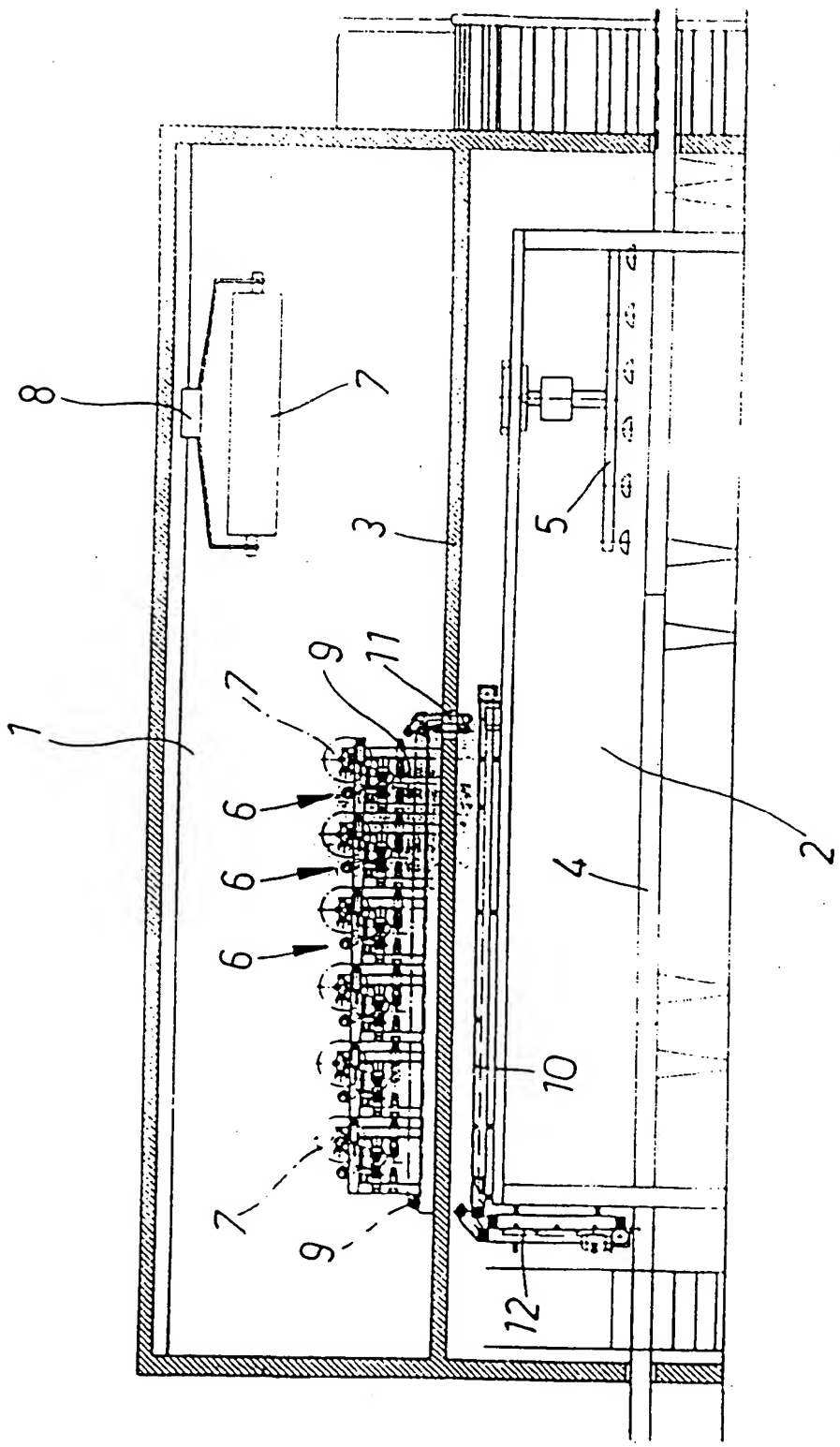

Fig. 1